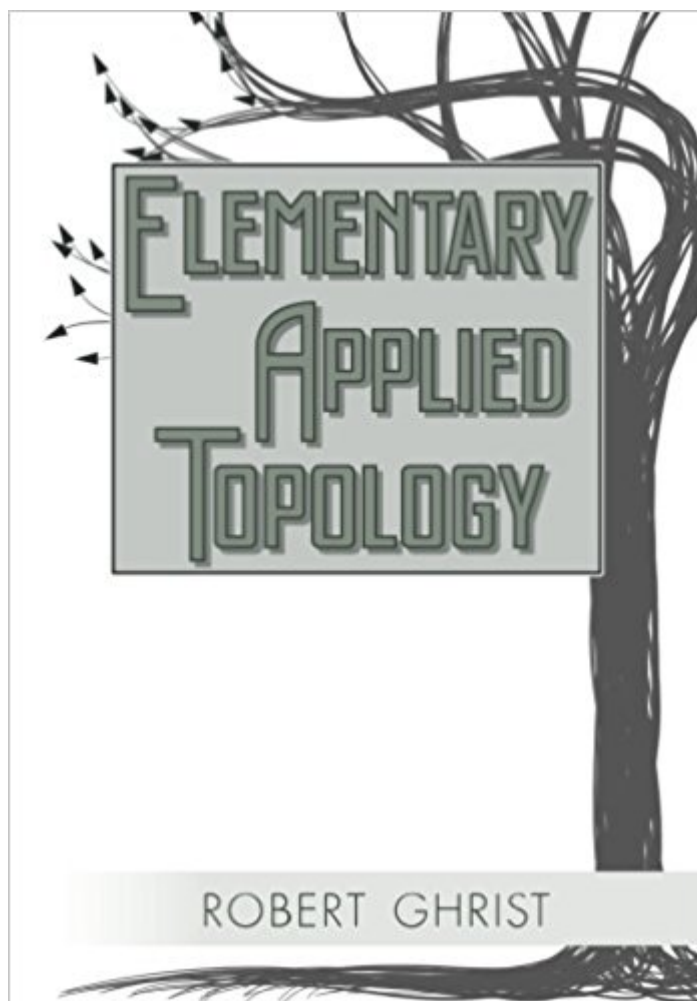The book was found

Elementary Applied Topology

ELEMENTARY
APPLIED
TOPOLOGY

ROBERT GHRIST

Synopsis

This text gives a brisk and engaging introduction to the mathematics behind the recently established field of Applied Topology. Over a century of development of principles and techniques in algebraic topology has of late crossed over to a variety of application domains. This text gives a completely novel introduction to these methods in the context of the applications. "Elementary Applied Topology" is short (250 pp. plus bibliography and index) and richly illustrated, with 268 figures. It is perfect for both self-study, and as the basis for a course in applied topology. This book is also well-suited for use as a supplementary text in a more traditional algebraic topology course, providing both context and motivation for the tools to be learned. The progression of mathematical techniques is a fresh approach. The book begins with a quick trip through manifolds and cell complexes. The segue to algebraic topology comes in the form of the Euler characteristic and the Euler calculus born from it. Passing from this to homology, exact sequences, and cohomology sets the stage for the innovative content to come. This is comprised of modern Morse theory (including discrete Morse theory, Conley index, and stratified Morse theory), sheaf theory (with an emphasis on cellular sheaves and cosheaves), and, finally, category theory and categorification. Every tool and topic is paired with an application. These range in scope across the biological, economic, engineering, material, physical, and statistical sciences. Of particular note are the applications to topological data analysis, including persistent homology and barcodes. "Elementary Applied Topology" is the first comprehensive text on applied algebraic topology for students of all mathematical sciences.

Book Information

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Customer Reviews

Robert Ghrist is the Andrea Mitchell PIK Professor of Mathematics and Electrical & Systems

Engineering at the University of Pennsylvania. He is a celebrated researcher in Applied Mathematics whose achievements were recognized by President Bush in 2004 [PECASE award] and by Scientific American magazine in 2007 [Top50 for research]. Among his honors is the 2013 Chauvenet Prize, the highest award given for expository writing in mathematics. As a teacher, he is renowned for illustrating difficult mathematics cleanly and clearly, as evidenced by the popularity of his animated on-line "Calculus: Single Variable" video course.

This well written pot-pourri contains an incredible number of scientific and engineering problems pertinent to topology (or vice-versa). The writing is concise, keeping the book short but requiring a more sustained attention from the reader, and well illustrated. Be warned that the book is hardly a mathematical textbook, as it includes neither proofs nor exercises, but more of a graphical complement to a more standard topology book.

This is an odd and wonderful book. It does NOT fit the mold of either a textbook (exercises are online and it does not use traditional problem/ example/ exercise/ proof/ you try it logic) or a popular account (WAY too advanced, this is grad or post grad level, as the writing is compact and terse and the diagrams, though awesome, are far from explained or intuitive, they are more like puzzles, both in figuring out what they mean, and even how they relate to the surrounding text!Part of this is that "Applied" topology is a very new field. The applications aren't, but the math behind them are. Engineers have known for a long time how a circle rocker works to change rotational motor motion into the back and forth of windshield wipers, but it is recent that complete topological math now shows how and why at a much deeper level of abstraction. How this will make for better wipers, I'm not sure, but our great grandkids will probably laugh at wipers anyway given either weather control or force fields around windshields!Be very careful of the word "elementary" -- unless you already know topology inside and out and the word pertains to applications. The author writes in extremely compact fashion, overloading each paragraph with information and witty cartoons, which is a great value for your buck, but will take deep study of each sentence, including trips back to a more traditional topo text or the web to get even half of it.The cool thing about just reading this for pleasure, and the author's wit and writing ability makes that possible, is that you'll get an overview of how one of the most theoretical and abstract topics in math actually has a LOT of impact on the "real" world. In many schools in the US at least it is now possible to get a PhD in math without even covering set theory, for example. Linear algebra is also being dropped from a lot of High School programs. So other reviews around the web that say this is a great companion undergrad text-- well,

yeah, for a Senior in math at MIT with set and category theory and two topo courses done, maybe. I'm a mathematician from the computational side, and frankly had to study a page a day to understand over half of the material. That said, just reading this almost subliminally cranks your brain with new insights, because the missing proofs and exercises are replaced with three things that are much more intuitive: great cartoons, great writing, and numerous practical examples. After reading thousands of tech books, this is a real unicorn. Stick it with a Springer imprint, and you've got an instant $300 classic. Thanks to the author for making such painstakingly written and researched material (the bib is awesome) accessible to those of us on a budget.

The word Elementary is a misnomer, as the prerequisites are many: one really should not try to read this book without a decent amount of background in Algebraic and Differential Topology. On the other hand, the material is quite elementary in the sense that it only skims the surface of Applied Topology, and well it should! The field is very new and Rob Ghrist is one of the leading researchers in the field, so it makes sense to have a broad survey of the wonderful results achieved by applying Algebraic Topology to various "applied" fields like engineering.This is a very unconventional text: it has too few proofs to be a mathematics text, but too much theoretical content to be, say, an engineering text. But the goal of the book is not to satisfy people in either area, as much as it is to show people in both areas that "hey! maybe there's something cool over here".The strength of this book is in the very lucid, intuitive explanations of both theory and application: "true" practitioners in either field will find the explanations of their respective fields insufficient, but be glad to not be overwhelmed by overly technical explanations of the other side. The very pretty pictures also tend to be quite illuminating, though one might have to stare at them for a few minutes (or hours) sometimes.

very satisfied with everything.

Excellent book and excellent service!

Robert Ghrist is a professor at the University of Pennsylvania and the creator of a wonderful Calculus MOOC. I recently completed the courses and was impressed with the content, especially the graphics, of the lectures, and the variety of challenges in the homework and exam problems. You can view the lectures without having to sign up for the course by going to this web site:https://class.coursera.org/calcsing-005/lecture/previewI mention these lectures because the

figures in Elementary Applied Topology are of similar quality: clean and clever. To understand topology, visualizations are critical, and of what I have read so far in the book, there is a nice coordination between text and images. Also like the Calculus MOOC, the book is not for those unfamiliar with the subject.One reason to buy this book -- it supports the project of thoughtful and creative self-publishing at a reasonable price. As Prof. Ghrist writes on his blog:

"IÃƒÂ¢Ã â¬Ã â„¢m allowed to be different. I really wanted to put figures on the front and back cover of my text; a lot of publishers of monograph series in Mathematics have rigid style formats and wonÃƒÂ¢Ã â¬Ã â„¢t allow that. Also, I decided to put some Joycean puzzles hidden in the book (allusions, secret codes, etc.) to keep me sane while dealing with writerÃƒÂ¢Ã â¬Ã â„¢s block. I didnÃƒÂ¢Ã â¬Ã â„¢t have to ask permission from a publisher to do something weird."
See: http://www.math.upenn.edu/~ghrist/whyselfpublish.html

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Principles of Mathematical Analysis (International Series in Pure and Applied Mathematics) (International Series in Pure & Applied Mathematics) Elena Bablenis Haveles BS Pharm Pharm D's Applied Pharmacology 6th (Sixth) edition(Applied Pharmacology for the Dental Hygienist [Paperback])(2010) Introduction to the Foundations of Applied Mathematics (Texts in Applied Mathematics) Applied Biopharmaceutics & Pharmacokinetics, Sixth Edition (Shargel, Applied Biopharmaceuticals & Pharmacokinetics)